

WHAT IS CLAIMED IS:

1. An apparatus comprising a waveform generator which digitally synthesizes a waveform having a plurality 5 of successive portions that can each be as short as one of a mono-cycle of said waveform and a part of a mono-cycle of said waveform, said waveform generator changing at least one of a frequency, a phase and an amplitude of said waveform between each successive pair of said 10 portions thereof.

2. An apparatus according to Claim 1, wherein said waveform generator includes an analog section for converting said digitally synthesized waveform into an 15 analog waveform.

3. An apparatus according to Claim 1, wherein said waveform generator includes:

a digital accumulator having a first input responsive to a frequency coefficient, having a second input, and having an output coupled to said second input;

5 a digital adder having a first input responsive to a phase coefficient, having a second input coupled to said output of said accumulator, and having an output;

10 a digital sine generator having an input coupled to said output of said adder, and having an output, said sine generator producing at said output thereof a value which is the sine of a value at said input thereof; and

15 a digital multiplier having a first input responsive to an amplitude coefficient, having a second input coupled to said output of said sine generator, and having an output;

20 wherein said waveform generator changes at least one of said frequency coefficient, said phase coefficient and said amplitude coefficient at the end of each said portion of said waveform.

4. An apparatus according to Claim 3, wherein said waveform generator includes:

25 a digital-to-analog converter having an input coupled to said output of said multiplier and having an output; and

a bandpass filter having an input coupled to said output of said digital-to-analog converter, and having an output.

5. An apparatus according to Claim 3, wherein said waveform generator includes a further digital adder having a first input responsive to a calibration coefficient, having a second input coupled to said output of said sine generator, and having an output, said second input of said multiplier being coupled to said output of said further digital adder.

10 6. An apparatus according to Claim 5,  
wherein said waveform generator includes a control section having a plurality of first-in-first-out memories which are operated in synchronism and which each have an output; and

15 wherein said accumulator, said adders, and said multiplier each have said first input thereof coupled to the output of a respective said first-in-first-out memory.

20 7. An apparatus according to Claim 6, including:  
a counter having a load input, having a data input coupled to an output of one of said first-in-first-out memories, and having an output which is actuated in response to a predetermined count condition; and

25 a gate having a first input responsive to a change enable signal, having a second input coupled to said output of said counter, and having an output which is coupled to said load input of said counter and to a read input of each of said first-in-first-out memories.

8. A method comprising: digitally synthesizing a waveform having a plurality of successive portions that can each be as short as one of a mono-cycle of said waveform and a part of a mono-cycle of said waveform, including changing at least one of a frequency, a phase and an amplitude of said waveform between each successive pair of said portions thereof.

9. An apparatus according to Claim 8, including converting said digitally synthesized waveform into an analog waveform.

10. An apparatus according to Claim 8, wherein said digitally synthesizing includes:

periodically adding a frequency coefficient to an accumulation value;

periodically adding a phase coefficient to a value which is a function of said accumulation value to thereby obtain a further value;

periodically determining a sine value that corresponds to a value which is a function of said further value;

periodically multiplying an amplitude coefficient by a value which is a function of said sine value to thereby obtain an additional value; and

changing at least one of said frequency coefficient, said phase coefficient and said amplitude coefficient at the end of each said portion of said waveform.

11. An apparatus according to Claim 10, including:  
converting successive said additional values into an  
analog waveform; and  
5 bandpass filtering said analog waveform.

12. An apparatus according to Claim 10, including  
periodically adding a calibration coefficient to a value  
which is a function of said sine value to thereby obtain  
10 a calibration value, said multiplying being carried out  
by multiplying said amplitude coefficient by a value  
which is a function of said calibration value.